

Research Article

Exploring Self-Efficacy Belief of Teacher towards Educational Technological Integration: Role of Gender, School Type, Teaching Experience and Teaching Subject

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ABSTRACT

This study examines the difference in self-efficacy belief towards educational technology integration and its dimensions for secondary school teachers across gender, school type, teaching subject, and teaching experiences. Data have been collected from 800 secondary school teachers with random sampling techniques. Descriptive statistics have been worked out, and t-values are calculated to check the significance of differences in mean scores across gender, school type, teaching subject, and teaching experiences on teachers' self-efficacy belief towards educational technology integration. Private secondary school teachers have higher scores in planning and designing learning experiences and attitude toward technology use. Female teachers have higher self-efficacy belief towards educational technology integration and its dimensions, namely support, planning and designing learning experiences, and attitude toward technology use.

Keywords: Self-efficacy belief, Educational technology integration, Gender, School type, Teaching subject, Teaching experience, Secondary school teachers

INTRODUCTION

Technology has impacted every facet of human life; however, its impact on classroom learning is still lagging behind. The times and present needs of society demand a paradigm shift in pedagogical approaches in education, which is possible through efficient technology integration. When it comes to integrating technology in classroom

transactions, the onus lies mostly on the teachers. It is required that both in-service teachers and pre-service teachers have the necessary knowledge, beliefs, and skills to utilize technology in teaching in order to provide effective technological environments for courses (Chen, Looi and Chen, 2009). However, according to Binghimlas (2009); Koehler *et al.* (2007); Schoepp (2005), integrating technology into education is a challenging, intricate, and dynamic process. The inclusion of technological possibilities by current teachers and prospective teachers may be impacted by a variety of factors, such as prejudices, attitudes, or experiences that may develop against these regulations (Belland, 2009; Galvis, 2012; Kaya and Yilayaz, 2013).

Among the various factors affecting technology integration, self-efficacy belief towards technology integration is very critical. Pajares (1992) is of the view that “the skills we possess, or what we have previously accomplished, are not always a good predictor of subsequent fulfilments because the beliefs we hold about our abilities powerfully influence the ways we behave.” According to Bandura (1982), the idea of self-efficacy is a personal evaluation of what a person can accomplish when faced with particular tasks. In other words, self-efficacy is the conviction that one can organize and use the essential skills to achieve desired objectives (Bandura, 1997; Skaalvik and Skaalvik, 2010). Self-efficacy can be defined as a teacher’s “judgment of his or her abilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated” (Tschannen-Moran and Woolfolk Hoy, 2007). Self-efficacy belief towards educational technology integration has been theorized to be a determining factor in how well a teacher can effectively use technology to improve teaching and learning (Albion, 2001; Enochs, Riggs and Ellis, 1990). A teacher’s perception of how effectively to use technology in the process of teaching and learning will impact their ability to do so. Teachers’ self-efficacy beliefs toward technology integration (SETI) is one of the most significant and defining factors of teachers’ genuine use of technology in their classrooms (e.g. Abbitt, 2011; Al-awidi and Alghazo, 2012; Anderson *et al.*, 2011; Ertmer and Ottenbreit-Leftwich, 2010; Sang *et al.*, 2010; Teo, 2009; Wang *et al.*, 2004). Generally, people with a strong sense of self-efficacy utilize a high degree of determination to complete a task and are likely to persist in challenging situations (Bandura, 1977). SETI does not focus on the knowledge or skills that teachers have about technology integration but rather on their beliefs or confidence in what they can do for technology integration (Al-awidi and Alghazo, 2012). In the literature, there are different studies that have examined preservice self-efficacy beliefs and technology integration. For instance, Compeau *et al.* (1999) conducted a longitudinal study to test the influence of computer self-efficacy beliefs, outcome expectations, affect, and anxiety on computer use. They found that high computer self-efficacy beliefs had a significant positive influence on

computer use. Albion (1999) indicated that lack of confidence of preservice elementary school teachers in their ability to integrate technology in their student teaching experiences negatively affected their ability to use computers.

Also, Hall (2008) found that teachers who have high computer self-efficacy were more persistent and creative in finding ways to integrate technology in genuine learning experiences. These results were supported by Abbitt and Klett (2007), who found that preservice teachers' perceptions of comfort with computer technology were a significant predictor of self-efficacy beliefs towards technology integration (Al-Awidi and Alghazo, 2012).

Ball and Levy (2008) investigated the impact of self-efficacy, computer anxiety, and technology experience on instructor intention to use technologies in a small private university in the United States of America. They concluded that self-efficacy was the only major determinant of teacher intention. Teo (2009) examined the relationship between teachers' self-efficacy and intention to use technology using a sample of 1,094 pre-service teachers at a teacher training institute in Singapore. Teo found that teachers' self-efficacy beliefs had a direct effect on pre-service teachers' perceived usefulness, perceived ease of use, and behavioural intentions. Curts, Tanguma, and Peña (2008) also conducted a study to predict teachers' self-efficacy in using technology for pedagogical purposes using a sample of 438 teachers in a Hispanic school in Texas. They revealed that teachers' self-efficacy beliefs had a direct influence on classroom technology integration. Giles and Kent (2016) conducted their study using 28 pre-service teachers at a university's college of education in the United States to determine pre-service teachers' self-efficacy beliefs related to integrating technology into instruction. The data indicated that almost all (93%) of the participants incorporated technology into the lessons they taught, with the majority (68%) of participants reporting a high level of confidence in their ability to select and utilize technology in teaching. Further, 89% of the participants felt they could integrate technology across the curriculum, with 80% indicating they were able of determining the why, when, and how to do so most of the time.

Likewise, Albion (2001) explored teachers' self-efficacy on classroom technology integration using a sample of 89 pre-service teachers and found that teachers with high self-efficacy beliefs had more classroom technology integration. Another profound revelation on the subject came from Abbitt (2011) in his study on self-efficacy beliefs in technology integration of pre-service teachers using Technological Pedagogical Content Knowledge (TPACK). The study was done using a sample of 450 pre-service teachers. Findings revealed that there was a strong positive correlation between self-efficacy and technology integration as predicted by TPACK domains. These studies

and many others from the literature clearly indicate that teachers' self-efficacy beliefs have a significant influence on classroom technology integration and, thus, form a basis for this study. The present study aims to examine secondary school teachers' self-efficacy beliefs towards educational technology integration across different demographic variables. The employment of pedagogically thorough technology in learning environments will surely help courses thrive and provide students with a better understanding of the subject matter. However, the crucial factor here is whether the technology is appropriate for the content, expertise, and competence needed to implement appropriate technology in classroom settings. Teachers, who are the primary implementers of technology-integrated classrooms, should have the necessary skills to employ the latest instructional technologies in their classrooms. The use of the most recent technologies in instruction is essential for improving course materials for millennial students. For instance, a 2003 study by Agodini, Dynarski, Honey, and Levin found that when teachers showed enthusiasm for using technology, student learning increased. Additionally, throughout their pre-service training, teachers may have formed preconceived views that prevented them from utilizing and integrating technology in the classroom. In order to frame teacher education curricula differently, teacher educators may benefit from examining teachers' perceived self-efficacy in terms of technology integration. Furthermore, as the majority of studies in the field have indicated, conducting more studies that focus on pre-service teachers' perspectives on integrating educational technologies into their classrooms would likely result in a greater appreciation of the foundations for educating digital native learners in the new millennium. The acculturation of the pedagogical paradigm shift can be hindered if research does not seek to characterize the existing levels of pre-service teachers' self-efficacy in technology integration and offer support for their growth in relation to their demands.

In line with this broad aim, the present study sought answers to the following research question and its sub-questions:

- What is the level of technology integration self-efficacy among teachers?
- Is there a relationship between teachers' self-efficacy beliefs of technology integration and gender?
- Is there a relationship between teachers' self-efficacy beliefs of technology integration and school types?
- Is there a relationship between teachers' self-efficacy beliefs of technology integration and teaching subject?
- Is there a relationship between teachers' self-efficacy beliefs of technology integration and teaching experience?

HYPOTHESIS OF THE STUDY

The present study tested the following null hypothesis.

- There is no significant difference in self-efficacy belief towards educational technology integration based on gender.
- There is no significant difference in self-efficacy belief towards educational technology integration based on school type.
- There is no significant difference in self-efficacy belief towards educational technology integration based on teaching experience.
- There is no significant difference in self-efficacy belief towards educational technology integration based on teaching subject.

METHODOLOGY

Participants

Stratified random sampling used to conduct the research. The sampling frame consisted of teachers employed in secondary schools with a minimum of five years of study. From the PSEB secondary schools in six districts of Punjab (Mohali, Mansa, Amritsar, Sri Muktsar Sahib, Fazilka and Ferozpur), a total of 800 teachers were selected. Table 1 presents the descriptive statistics for the participants' demographic characteristics, including their gender, grade, and programs.

Table 1: Descriptive statistics for participants' demographic characteristics

Variable	Category	Frequency	Percentage
Gender	Female	473	59.12
	Male	327	40.87
School type	Private	486	60.75
	Government	314	39.25
Teaching Subject	Science	306	38.25
	Non-Science	494	61.75
Teaching experience	Below five years	434	54.25
	Above five years	366	45.75

As seen in Table 1, a total of 800 teachers participated in the study. Among them, 327 were male and 473 were female. In terms of school type, 486 teachers were from private schools and 314 were from government schools. Furthermore, 306 teachers taught science subjects, while 494 taught non-science subjects. In terms of teaching

experience, 434 teachers had less than five years of experience, while 366 teachers had more than five years of experience in secondary schools.

Data Collection Instruments

The questionnaire used in this study was the Self-efficacy Belief towards Technology Integration Questionnaire. It consisted of 27 items that were categorized into six dimensions: performance expectancy (4 items), support (5 items), planning and designing learning experiences (5 items), use of computer technology/self-efficacy (4 items), motivating students and others for use of technology (5 items), and attitude toward technology use (4 items). The questionnaire showed good internal consistency reliability, as assessed by Cronbach's Alpha, with a value of 0.802. The factorial validity, as determined by the KMO and Bartlett's test, was also satisfactory, with a value of 0.880.

Data Analysis

Descriptive and inferential statistics were used to analyze teachers' self-efficacy belief towards educational technology integration. SPSS Table 2 was used to determine the mean, median, standard deviation, skewness, and kurtosis. The skewness value for self-efficacy belief towards educational technology integration is 0.46, indicating positively skewed data towards the right side. The kurtosis value, 0.14, is less than 0.263, suggesting a somewhat leptokurtic data distribution. The standard deviation for this variable is 9.54, which is not very significant. The mean and median are 109.08 and 108, respectively, indicating both positive and negative values. Therefore, it can be assumed that the data on teachers' self-efficacy belief towards technology

Table 2: Descriptive table on self-efficacy belief towards educational technology integration and its dimensions

Variables	Mean	Median	Standard Deviation	Skewness	Kurtosis
Self-efficacy belief towards educational technology integration	109.08	108	9.54	0.46	0.14
Dimensions of Self-efficacy belief towards educational technology integration					
Performance expectancy	16.95	17	1.69	-.066	-.190
Support	20.37	20	2.57	-.287	-.350
Planning and Designing learning Experiences	20.46	20	2.40	-.041	-.287
Use of Computer technology/ self-efficacy	15.51	16	2.01	.024	.158
Motivating students and others for use of technology	19.98	20	2.45	-.492	1.21
Attitude towards technology uses	15.79	16	2.31	-.184	-.108

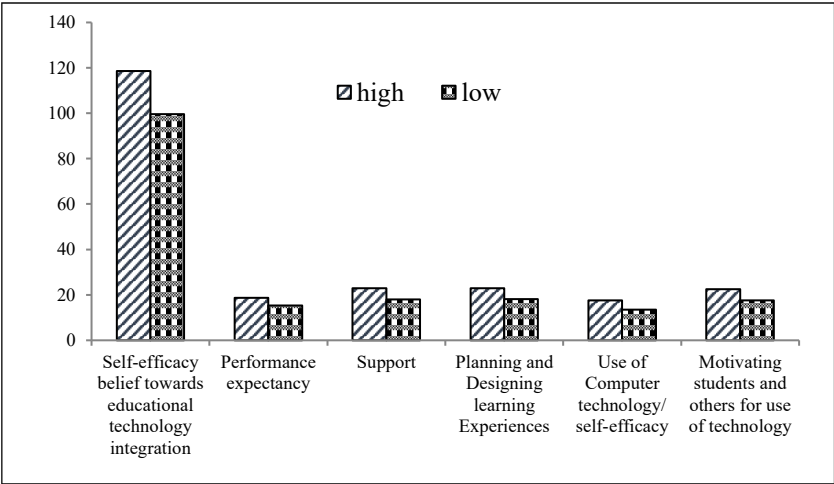


Figure 1: levels of scores of secondary school teachers on self-efficacy belief towards educational technology integration and its dimensions

integration are normally distributed. T-values were computed to compare mean scores across gender, school type, teaching subject, and teaching experiences.

FINDINGS

Gender effects on self-efficacy belief towards educational technology integration

t-test was executed to study the gender effects on self–efficacy belief towards educational technology integration of secondary school teachers. The mean and standard deviation of self-efficacy belief towards educational technology integration are shown in Table 3.

Table 3: The mean and standard deviation of teachers on self-efficacy belief towards educational technology integration and its dimensions across gender

Dimension	N	Female		N	Male	
		Mean	SD		Mean	SD
Performance expectancy	473	16.94	2.92	327	16.96	2.77
Support	473	20.53	6.23	327	20.12	7.06
Planning and Designing learning Experiences	473	20.65	5.82	327	20.18	5.55
Use of Computer technology/ self-efficacy	473	15.60	3.73	327	15.38	4.48
Motivating students and others for use of technology	473	20.06	6.67	327	19.86	5.04
Attitude toward technology use	473	16.01	5.08	327	15.46	5.64
Total	473	109.83	95.87	327	108	82.47

Table 4: t-ratio to study significance of gender based differences on self-efficacy belief towards educational technology integration

Dimensions	t-value	Post-hoc
Performance expectancy	0.18	-
Support	2.21*	Female>Male
Planning and Designing learning Experiences	2.73**	Female>Male
Use of Computer technology/ self-efficacy	1.52	-
Motivating students and others for use of technology	1.16	-
Attitude toward technology use	3.31**	Female>Male
Total	2.67**	Female>Male

*Significant at 0.05 level, **significant at 0.01 level

The significance of mean differences in self-efficacy belief towards educational technology integration of secondary school teachers across gender is presented in Table 3. The gender effect on Support ($t = 2.21$, $P < 0.05$), Planning and designing learning experiences ($t = 2.73$, $P < 0.01$), Attitude toward technology use ($t = 3.31$, $P < 0.01$) is found to be significant (Table 4). Similarly, significant gender effects have been found in overall SEB towards ETI ($t = 2.67$, $P < 0.01$). Post hoc analysis revealed that female secondary school teachers have higher self-efficacy belief towards educational technology integration ($M_{\text{female}} = 109.83$, $M_{\text{male}} = 108$, Table 3).

School type effects on self-efficacy belief towards educational technology integration

Table 5 shows the results of descriptive statistics and t-values for the scores on self-efficacy belief towards educational technology integration and its dimensions across different school types.

Table 5: The mean and standard deviation of teachers on self-efficacy belief towards educational technology integration and its dimensions across school type

Dimension	N	Private		N	Govt.	
		Mean	SD		Mean	SD
Performance expectancy	486	16.96	2.98	314	16.93	2.68
Support	486	20.53	6.36	314	20.11	6.90
Planning and Designing learning Experiences	486	20.68	5.79	314	20.13	5.54
Use of Computer technology/ self-efficacy	486	15.58	3.90	314	15.42	4.25
Motivating students and others for use of technology	486	20.10	6.73	314	19.78	4.85
Attitude toward technology use	486	16.05	5.20	314	15.38	5.38
Total	486	109.27	91.35	314	108.78	90.83

Table 6: t-ratio to study significance of differences across school type on self-efficacy belief towards educational technology integration

Dimensions	t-value	Post-hoc
Performance expectancy	0.22	-
Support	2.26*	Private>Govt
Planning and Designing learning Experiences	3.17**	Private>Govt
Use of Computer technology/ self-efficacy	1.11	-
Motivating students and others for use of technology	1.80	-
Attitude toward technology use	4.06**	Private>Govt
Total	0.71	-

*Significant at 0.05 level, **significant at 0.01 level

The significance of mean differences in self-efficacy beliefs towards educational technology integration among secondary school teachers across school types is presented in Table 5. The effect of school type on support ($t=2.26$, $P<0.05$), planning and designing learning experiences ($t=3.17$, $P<0.01$), and attitude toward technology use ($t=4.06$, $P<0.01$) was found to be significant, as shown in Table 6. Post-hoc analysis revealed that private secondary school teachers had a higher mean score on all significant dimensions ($M_{\text{private}}=109.27$, $M_{\text{govt}}=108.78$; Table 5).

Teaching subjects effects on self-efficacy belief towards educational technology integration

It shows the results of descriptive statistics and t-values for the scores on self-efficacy beliefs towards educational technology integration and its dimensions across teaching subjects.

Table 7: Mean and standard deviation of teachers' self-efficacy beliefs towards educational technology integration and its dimensions across teaching subjects

Dimension	N	Science		N	Non-Science	
		Mean	SD		Mean	SD
Performance expectancy	306	16.75	2.81	494	17.06	2.86
Support	306	20.51	6.38	494	20.27	6.73
Planning and Designing learning Experiences	306	20.42	5.95	494	20.49	5.65
Use of Computer technology/ self-efficacy	306	15.61	3.79	494	15.46	4.20
Motivating students and others for use of technology	306	19.95	6.25	494	20	5.87
Attitude toward technology use	306	15.82	5.54	494	15.77	5.28
Total	306	110.10	104.76	494	108.44	81.78

Table 8: t-ratio to study significance of differences based on teaching subject on self-efficacy belief towards educational technology integration

Dimensions	t-value	Post-hoc
Performance expectancy	2.53*	Non-Science> Science
Support	1.26	-
Planning and Designing learning Experiences	0.36	-
Use of Computer technology/ self-efficacy	1.02	-
Motivating students and others for use of technology	0.26	-
Attitude toward technology use	0.32	-
Total	2.39*	Non-Science> Science

*Significant at 0.05 level

The significance of mean differences in self-efficacy belief towards educational technology integration of secondary school teachers across teaching subjects is presented in Table 7. The teaching subject effect on performance expectancy ($t=2.53$, $P<0.05$) is found to be significant (Table 8). Teaching subject effects have been found in overall self-efficacy belief towards educational technology integration. Post-hoc analysis revealed that science teachers have been found to have a higher mean score on significant dimensions ($M_{science}=110.10$, $M_{non-science}=108.44$, Table 7).

Teaching Experiences effects on self-efficacy belief towards educational technology integration

The significance of mean differences in self-efficacy beliefs towards educational technology integration among secondary school teachers across teaching subjects is presented in Table 9. There is no significant difference in the teaching subjects that affect self-efficacy beliefs towards educational technology integration among secondary school teachers (M below 5 = 108.97, M above 5 = 109.21, Table 9).

Table 9: Mean and standard deviation of teachers' self-efficacy beliefs towards educational technology integration and its dimensions across teaching experiences

Dimension	N	Below 5 years		N	Above 5 years	
		Mean	SD		Mean	SD
Performance expectancy	434	16.92	2.91	366	16.97	2.81
Support	434	20.34	6.79	366	20.39	6.39
Planning and Designing learning Experiences	434	20.51	5.50	366	20.40	6.08
Use of Computer technology/ self-efficacy	434	15.57	4.01	366	15.44	4.08
Motivating students and others for use of technology	434	19.92	5.74	366	20.05	6.33
Attitude toward technology use	434	15.68	5.37	366	15.92	5.36
Total	434	108.97	89.46	366	109.21	93.25

Table 10: t-ratio to study significance of differences based on teaching experiences on self-efficacy belief towards educational technology integration

Dimensions	t-value
Performance expectancy	0.43
Support	0.26
Planning and Designing learning Experiences	0.62
Use of Computer technology/ self-efficacy	0.91
Motivating students and others for use of technology	0.75
Attitude toward technology use	1.46
Total	0.34

DISCUSSION OF THE RESULT

The analysis of the gathered data for the present study, which questioned the technology integration self-efficacy of secondary school teachers, revealed that teachers at secondary schools in Punjab have a high degree of self-efficacy in technology integration into their teaching environments. As for the independent variables of the present study, which are gender, school type, academic stream, and teaching experience of the participants, the findings revealed that while gender, school type, and academic stream show a significant difference in the technology integration self-efficacy level of the secondary school teachers, the teaching experience variable did not show any significant difference.

Regarding the role of gender in secondary school teachers' technology integration self-efficacy beliefs, the findings of the present study found that there were significant differences between groups for support, planning & designing learning experiences, attitude towards technology use, and the overall scores of the scale. In other words, the participants' gender does have an impact on their self-efficacy beliefs in technology integration. Although further analysis of gender depicted that female participants possessed slightly higher mean values in the sub-scales and the overall scores. The findings of the present study concerning the gender variable show dissimilarities with the results of Keser *et al.* (2015) who found no statistically significant difference, whereas there seems to be a similarity with the findings of Unal (2013) who found significant differences in teachers' beliefs on technology integration self-efficacy concerning the gender of the participants. Gender-based differences have also been reported by Umoh (2003); Cooper (2006); Maric (2018) that showed there is a significant difference between male and female secondary school teachers.

The findings of the present study additionally revealed that school type plays a significant effect on support, planning & designing learning experiences, and attitude

towards technology use. However, no significant effects were observed for overall scores.

Furthermore, the findings of the present study revealed that the academic subject of the participants plays a significant role in performance expectancy and overall scores of self-efficacy belief towards technology integration. This finding, which revealed that the majors of the pre-service teachers play a significant role in their technology integration self-efficacy, shows dissimilarity with the findings of Unal's (2013) study in which it is found that majors of the participants do not have a significant role in the technology integration self-efficacy of teachers.

The present study reveals that teaching experience has no significant effects on self-efficacy beliefs towards technology integration scores.

Overall, the present study reveals that secondary school teachers have a certain level of self-efficacy in integrating technology. This self-efficacy can be gradually enhanced through initial teacher training. Additionally, the participants' gender and academic stream seem to have some influence on teachers' self-efficacy in integrating technology. Regarding the general findings of the study, it can be concluded that teachers are willing to incorporate technology into their future classrooms. However, they may face challenges when it comes to requiring others to use technology. Therefore, it is recommended that teacher training institutions develop further initiatives to improve preschool teachers' technology integration skills. This could include placing emphasis on requiring others to use technology in the teaching environment.

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